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R-1 Wildlife Division Staff:

Neil Anderson, Regional Wildlife Manager, Kalispell, nanderson@mt.gov, (406) 751-4585
Kim Annis, Bear Management Specialist, Libby, kannis@mt.gov, (406) 293-4161
Dwight Bergeron, Mitigation Wildlife Biologist, dbergeron@mt.gov, (406) 751-4587
Diane Boyd, Wolf-Carnivore Specialist, Kalispell, dboyd@mt.gov, (406) 751-4586
Tonya Chilton-Radandt, Wildlife Biologist, Libby, tchilton@mt.gov, (406) 293-4146
Jessica Coltrane, Wildlife Biologist, Kalispell, jcoltrane@mt.gov, (406) 751-4584
Cecily Costello, Research Biologist, Kalispell, ccostello2@mt.gov, (406) 751-4583
John Grant, Wildlife Area Manager, Ninepipe, jgrant@mt.gov, (406) 644-2510
Chris Hammond, Wildlife Biologist, Kalispell, chammond@mt.gov, (406) 751-4582
Franz Ingelfinger, Restoration Ecologist, Kalispell, finglefinger@mt.gov, (406) 751-
Tim Manley, Grizzly Bear Management Specialist, tmanley@mt.gov, (406) 892-0802
Jesse Newby, Research Technician, Kalispell, jnewby@mt.gov, (406) 751-4588
Lori Roberts, Research Technician, Kalispell, lroberts@mt.gov, (406) 751-4581
Bruce Sterling, Wildlife Biologist, Thompson Falls, bsterling@mt.gov, (406) 827-4389
Tim Thier, Wildlife Biologist, Trego/Eureka, tthier@mt.gov, (406) 882-4697
Erik Wenum, Bear and Mtn. Lion Management Specialist, Kalispell, ewenum@mt.gov, (406) 756-1776
Alan Wood, Mitigation Program Manager, Kalispell, awood@mt.gov, (406) 751-4595

R-1 Communication and Education Division:

John Fraley, Information and Education Program Manager, Kalispell, jfraley@mt.gov, (406) 751-4564

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Mountain Goats of Northwest Montana: A Historical Perspective

Jessy Coltrane, PhD
Kalispell Area Wildlife Biologist
Montana Fish, Wildlife & Parks

Background. — Mountain goats (*Oreamos americanus*) historically occupied most available montane cliff habitat throughout northwest Montana (Fish Wildlife, & Parks administrative Region 1); however, since the 1950s, native mountain goat numbers have experienced a dramatic decline. Thus, once occupied habitat is now devoid of goats, and current mountain goat range is significantly reduced from its historic expanse.

In the 1940s and 1950s, mountain goats were considered an abundant and not easily depleted resource in northwest Montana. Population estimates for mountain goats in the region described 350 mountain goats in the Swan Mountains, 20 in the North Fork of the Flathead, 315 in the Clark's Fork, 900 in Glacier Park, 100 near Coram, 450 from Spotted Bear to Schaffer Meadows, and 250 in Big Prairie (Montana Department of Fish and Game 1958). Native herds in the South Fork of the Flathead River and the Swan Mountains were used as source populations to establish new goat herds in mountain ranges throughout Montana and Colorado (Picton and Lonner 2008). In addition to capture removals, wildlife managers allowed for unlimited harvest of mountain goats. At the time, little was known about the ecology of mountain goats, and they were managed similarly to other ungulates, such as bighorn sheep (*Ovis canadensis*) and white-tailed deer. Local biologists mistakenly believed that increased harvest pressure would increase the productivity of the herd (Montana Department of Fish and Game 1958).

Compounded with the lack of understanding of goat biology, biologists thought the remoteness of mountain goat habitat would impede access, and therefore harvest would never significantly impact the population; however, by the 1960s, timber harvest and associated logging roads pioneered routes into the backcountry, opening the way for hunters. Mountain goats, susceptible to over-harvest and disturbance, began to decline in numbers and entire herds disappeared. By 1960, biologists observed a dramatic decline in goat numbers in certain areas due to increased accessibility, and the first restrictions were placed on goat harvests. By 1972, all hunting districts in the region were being managed by a limited permit system. Unfortunately, it was too late for some goat herds.

Within 30 years, native goat herds had gone from seemingly unlimited resources to depleted and declining. Concern for the species generated studies to better understand their biology and population dynamics. By the early 1980s, research on mountain goats revealed insights into their natural history that distinguishes them from other northern ungulates. Biologists found that female mountain goats exhibit late primiparity (with the majority at 4 to 5 years) and recruitment

is extremely low (Adam and Baily 1982, Swenson 1985, Smith 1986, Festa-Bianchet et al. 1994, Cote and Festa-Bianchet 2001a). Productivity for adult females typically increases from 6 to 9 years of age, and senescence begins around 10 years (Cote and Festa-Bianchet 2001a;c). In addition, there is evidence that females produce more male young as they age (Cote and Festa-Bianchet 2001b). Unlike other ungulates, annual production varies dramatically, as well as kid survival (Festa-Bianchet et al. 1994). While yearling survival appears high, mortality of 2- and 3-year-old goats is higher than for other ungulate species, making population recruitment low (Festa-Bianchet et al. 1994). Furthermore, female mountain goats exhibit high site fidelity, which limits dispersal into open habitat, making natural reestablishment of herds difficult (Festa-Bianchet and Cote 2008). These unique biological and social characteristics make them susceptible to over-harvest.

Current goat hunting districts were established in 1986 (Figure 1), and wildlife biologists have been reducing the number of licenses available ever since. Despite dramatically reduced harvest, mountain goat populations in Region 1 have not rebounded to historic levels, and most populations are described by the local management biologists as declining, with a few potentially stable populations. Currently, wildlife biologists in the region are faced with uncertainty concerning the future of native herds and a need for additional data to better ensure their persistence.

Population Monitoring and Trends. — Comparisons of historic survey data to data collected post-1980 indicate a 3- to 4-fold decline in goat numbers throughout northwest Montana; however, evaluation of goat status in more modern times has proved difficult. Due to the sporadic nature of the quality and timing of goat surveys after 1980, it is not possible to complete any statistically valid trend analysis for most hunting districts, except for HDs 100 and 101. Analyses of these survey data indicated declining population trends in both hunting districts. While statistically valid trend analyses are not possible for the remaining hunting districts in Region 1, none of the data indicated growing population trends. At best, it appears that a few hunting districts in the region may have obtained stable number of goats since allowable harvest was severely restricted beginning in the mid-1980s (Table 1).

Harvest Trends. — Prior to 1960, harvest reporting was not consistent, and therefore harvest data are difficult to interpret. Regardless, regional harvest of mountain goats has declined dramatically since the reported high harvest of 295 goats in 1958 to 16 goats in 2016 (Figure 2). In 1963, hunter numbers reached a high of 817 and then steadily declined to 297 hunters in 1970. Presumably, this decline in hunter participation was in part a response to declining goat availability, as success rates dropped from an average of 32% (1960-1963) to 26% (1964-1970), as well. Since 1972, hunter success rate has been a function of available licenses. Since 1984, when permits were reduced to 78, success rate has consistently exceeded 50% (50 – 96%). With few licenses currently available, success rate is not a reliable metric to evaluate goat population status, beyond ascertaining that some goats remain.

Adult survival, particularly survival of older-aged females, and not recruitment, appears to drive population changes in mountain goats (Cote and Festa-Bianchet 2001a, Hamel et al. 2006). Therefore, harvesting adult females can have a profound impact on mountain goat populations. Historically, hunters harvested male and female mountain goats relatively indiscriminately. The relatively high number of females in the harvest might be attributed to the lack of understanding of goat biology on part of the managers and resulting lack of education imparted to hunters. After 1980, biological understanding of mountain goats improved, as did educational efforts to curtail female harvest; however, 10-year averages of percent females in harvest did not drop significantly until 2011 – 2016 ($23 \pm 11\%$), but the number of adult females (≥ 4 years old) has remained high (38% in 2016). The continued harvest of adult females may reflect low overall population numbers. As populations decline, nanny groups are more easily located due to the relatively larger group size and therefore may be more susceptible to harvest than males.

Sustainable Harvest Rates. — Mountain goats are highly susceptible to over-harvest (Smith 1986, Festa-Bianchet et al. 1994, Côté et al. 2001), as hunting appears almost completely additive to natural mortality in native populations (Adam and Baily 1982, Swenson 1985, Smith 1986, Côté and Festa-Bianchet 2001a). While hunting can be sustainable when managed conservatively, over-harvest has been associated with declines of mountain goat populations across their range (Gonzalez-Voyer et al. 2003, Hamel et al. 2006, Festa-Bianchet and Côté 2008, Rice and Gay 2010). While most biologists recognize the need for conservative management of native mountain goat populations (Smith and DeCesare 2017), determining sustainable harvest rates is challenging. Variability in vital rates and population size influence sustainable rates of harvest (Rice and Gay 2010); however, these data seldom exist for individual populations. In Alberta, Hamel et al (2006) found that native mountain goat populations (> 100 individuals) could tolerate harvest rates of about 1%, and harvest rates greater than 3% were considered not sustainable (Gonzalez-Voyer et al. 2003, Festa-Bianchet and Cote 2008). Rice and Gay (2010) determined that a rate of 4% was sustainable for populations ≥ 100 , but indicated that this rate may also cause periodic declines. In addition to harvest rate, size of native populations should be considered carefully when managing mountain goats. Typically, populations with ≤ 25 individuals will have a negative growth rate, even in the absence of hunting, and will face extinction in 40 years.

Determining sustainable rates of harvest for mountain goat populations in Region 1 is wrought with difficulty due to lack of pertinent data, including current or complete survey data for many hunting districts, vital rate data for specific populations, and delineation of functional populations. The number of licenses available in each district is considered the “allowable harvest.” Based on the mid-point of estimated number of goats and the allowable harvest for each hunting district in 2016, harvest rates for all but one district (HD 142) could range from 3 – 12 %. Furthermore, no hunting district was estimated to have goat numbers reaching 100, except for possibly HD 100. If we consider hunting districts within the Bob Marshall Complex (HDs

132, 133, 140, 141, 142, 150 and 151) as a single population, the estimated population would be 359 mountain goats. Current allowable harvest would be approximately 4%. Based on these limited data, it is probable that the current allowable harvest for mountain goats is not sustainable.

Nonhunting Anthropogenic Impacts. — In addition to hunting-related mortality, human activity in goat habitat can impact mountain goat populations by altering habitat use and/or behavior (Chadwick 1974, Foster and Rahe 1983, Cote et al. 2013, St-Louis et al. 2013, Richard and Cote 2016, White and Gregovich 2017). Logging, in particular, has played a role in altering the landscape of northwest Montana since the 1800s. Logging activities and associated road construction in the 1960s and 1970s not only displaced mountain goats, but opened the high country to human access, resulting in increased harvest and poaching (Chadwick 1974).

Recreational activities can also have negative effects on mountain goats, especially during winter and early summer, critical periods when disturbance can result in cumulative negative impacts on survival. In winter, mountain goats are physiologically stressed due to high energetic costs of thermoregulation coupled with low quality and limited nutritional resources. Winter motorized activity, such as helicopter-assisted skiing and snowmobiling, can cause stress responses in goats and displace goats from wintering areas (Hurley 2004). During kidding and post-kidding periods, adult female mountain goats have heightened sensitivity to disturbances (Penner 1988). Compared to other ungulates, mountain goats have a low recruitment rate (Bailey 1991, Festa-Bianchet et al. 1994), and reproductive success and survivorship of goat populations are closely tied to the health of mountain goat nursery groups.

The demand for motorized recreational activities is increasing in and around mountain goat habitat on National Forest Lands (USDA Forest Service 2016). The Forest Service has created alternatives for the Flathead National Forest that do not allow for a net increase in winter motorized travel in mountain goat habitat; however, over-snow motorized travel is allowed in some historic mountain goat habitat, which may continue displacement and/or impede recolonization in these areas.

Conclusions and Management Implications. — The biggest management challenge facing mountain goats in Region 1 is the lack of data. Comprehensive and current survey data are needed for most hunting districts, as well as vital rate data for native populations. Determining viable populations of goats within the region is paramount to assess sustainable harvest rates. In lieu of these data, goats should be managed conservatively, including reducing harvest quotas and potentially eliminating licenses in some hunting districts. Based on the available data, we have reduced harvest quotas to one either sex mountain goat in all hunting districts, except HD 101 (reduced to 2) for the 2017/2018 regulatory year. During summer 2017, aerial surveys will be prioritized for hunting districts lacking current or complete survey information.

Table 1. Most recent survey data, estimated population size, survey quality and coverage, and of mountain goats in hunting districts in Region 1, northwest Montana.

HD	Last Surveyed	Complete Survey	Survey Quality	Minimum Count	Estimated Population	Estimated Status Since 2000
100	2015	No	Poor	40	80-95	Declining
101	2016	No	Good	25	45-60	Declining
131	2011	Yes	Fair to Poor	12	16-18	Declining
132	2005	No	Fair	24	31-36	Unknown
133	2004	Unknown	Unknown	48	36-42	Declining
134	2010	Unknown	Unknown	10	13-15	Declining
140	2013	Yes	Good	50	60 -70	Stable
141	2016	Yes	Good	50	58-65	Unknown
142	2012	Yes	Unknown	56	67-73	Stable
150	2008	No	Unknown	44	57 -66	Stable
151	2008	No	Unknown	16	Unknown	Unknown

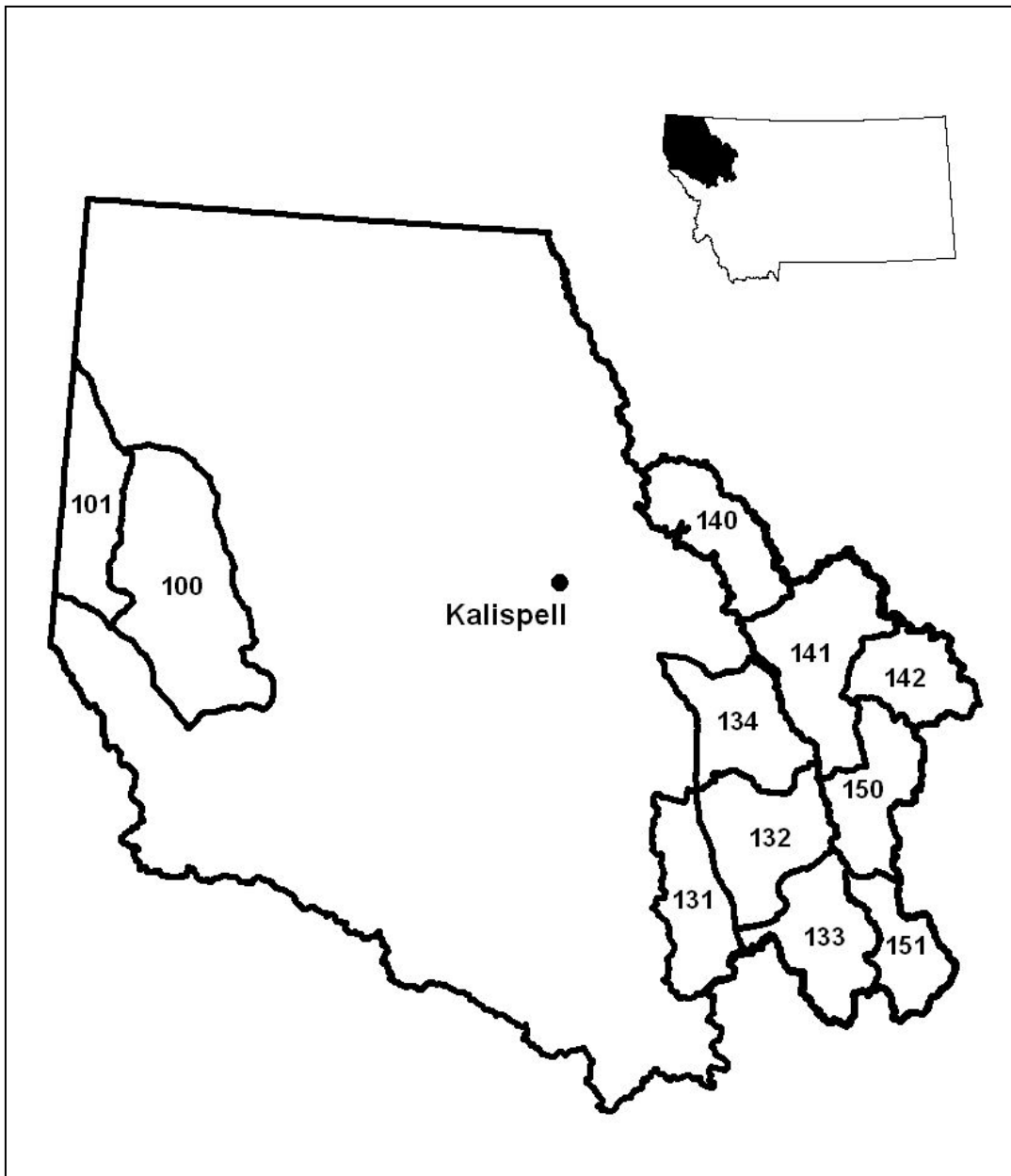


Figure 1. Montana Fish, Wildlife & Parks' hunting districts in administrative Region 1.

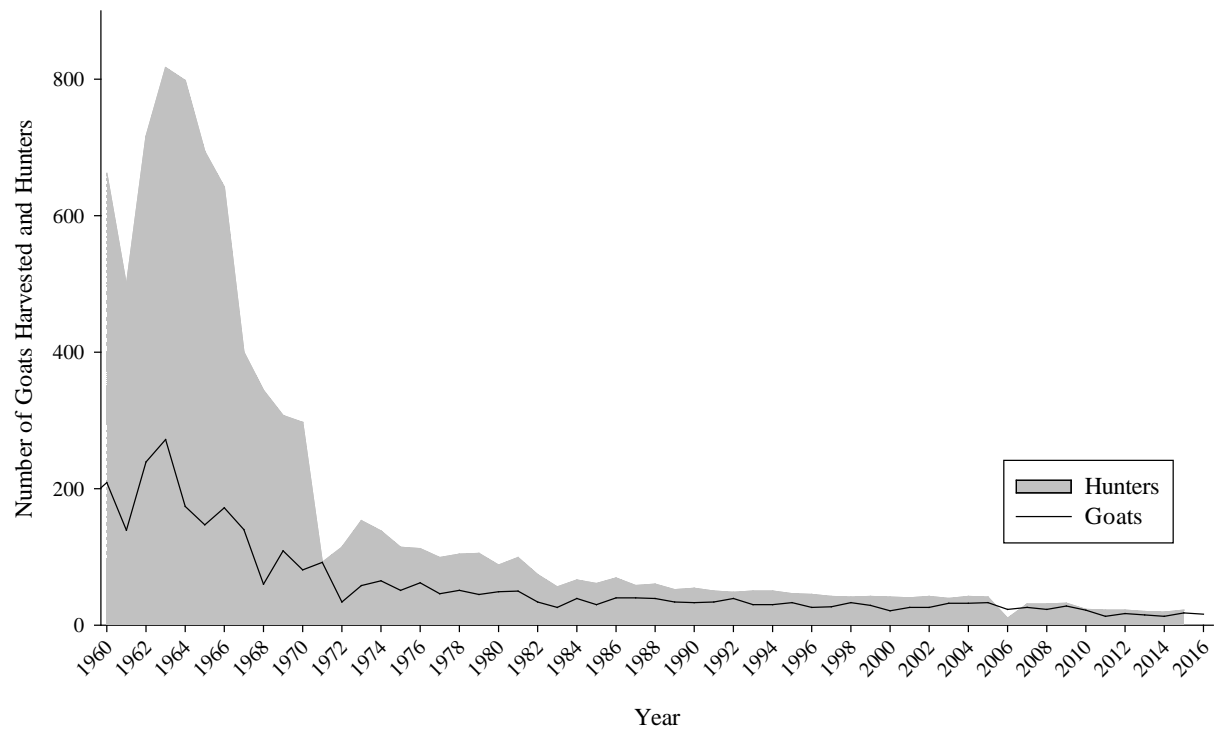


Figure 2. Mountain goats harvested and hunter numbers for FWP Region 1, northwest Montana (1960-2016).

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Tobacco Plains Elk - An International Resource

by

Tim Thier, FWP Area Biologist

The management of elk in the Tobacco Valley in north Lincoln County presents more than the usual number of challenges for wildlife managers. Nestled between Eureka and the British Columbia border, wintering elk numbers in the past 25 years have grown from approximately 100 to over 800 and fluctuate depending on winter severity. Trying to find a balance in the management of this herd has been a work in progress.

Historically, not a lot of information exists on elk presence in this area, although some level of use probably occurred. The mountains adjacent to the valley were better known for caribou than elk. The Kootenai or Ktunaxa Indians, the original residents of this area, would go to great lengths and risks to hunt buffalo on the eastern plains each year in order to supplement their protein needs.

As more people began moving west and colonizing this area, the abundance of big game diminished as settlers struggled to feed their families. Conditions worsened even more in the 1930s during the Great Depression. However, as early as 1912 efforts were underway to restore elk to northwest Montana with the release of 31 elk from Yellowstone National Park to Glacier National Park, east of the Tobacco Valley. In 1927 and 1928, an additional 56 elk were released in Wolf Creek to the south. Transplants continued to the south and west of the Tobacco Valley from 1952 until 1988, with the final release consisting of 31 elk east of Murphy Lake from the National Bison Range.

Elk numbers wintering in the Tobacco Valley have been variable, with 100-200 estimated in the early 1990s. During the severe winter of 1996-97, this number swelled to over 400. By 2012, over 800 elk were observed during a single spring flight, representing a total population of probably over 1,000. While a welcome sight by many, not everyone shared this view. Area ranchers were expressing increasing frustrations with that many elk on the landscape as the elk damaged fences and haystacks and competed with cattle for forage. In an effort to address their concerns, opportunities to harvest antlerless elk were created and expanded for both the general and a specially created late season.

At the same time, recognizing the importance of the Tobacco Valley for wintering elk, the U.S. Forest Service, working in conjunction with the Rocky Mountain Elk Foundation, worked many years to maintain and improve wintering elk habitat in the Gateway area northwest of Eureka. This was done primarily through the use of controlled burns that slowed the spread of conifer encroachment and improved the palatability of bitterbrush and grasses. However, in recent years, there has been an ever-increasing amount of smooth brome, a nonnative grass that can cover large areas and is avoided by wintering elk. Areas that had once supported native bunchgrasses, forbs, and bitterbrush that were critical to wintering elk were slowly being converted to a monoculture of smooth brome. In response, the Forest Service is actively testing various treatments in that area to reduce the spread of smooth brome and restore native vegetation.

A common question for many is “whose elk are they?” Given the proximity of the Tobacco Valley to British Columbia, it was expected that at least some of the animals were spending their summers to the north. While elk were creating their share of issues with local ranchers, hunters and others were viewing them as a very valuable resource. In fact, given their proximity to Canada, they were an international resource. This was even further accentuated by the fact that just north of the border is the Tobacco Plains Band of the Ktunaxa Indians Reserve. As a sovereign nation, these native people also have a vested interest in these elk.

Until recent years, the vast majority of the elk that wintered in the Tobacco Valley dispersed to parts unknown in early spring. Now, an increasing number of these elk have decided to become year-round residents, where they are away from most predators and can grow fat on irrigated alfalfa fields. This didn’t sit well with many ranchers, who now have to contend with elk on a year-round basis.

Complicating the issue is the fact that most ranches in the Tobacco Valley are quite small. An increase in private residences interspersed among the agricultural areas has made public hunting a significant safety concern. Ranchers are hesitant to let total strangers hunt on their property due to liability issues associated with hunting with a rifle.

In an effort to gather additional information on these elk, FWP submitted a proposal to the Rocky Mountain Elk Foundation in November of 2013 for financial assistance in the purchase of 6 satellite transmitters in order to gather baseline information on this herd. Elk were captured in February 2015 with the use of large “Clover Traps” baited with hay. Captured elk were then immobilized to facilitate handling. A total of 9 elk were captured in 8 days at 3 different sites within the Tobacco Plains. Two adult cow elk were radio-collared and released at each of the 3 sites.



Figure 1. An adult cow elk captured inside a clover trap on the edge of the Tobacco Plains.



Figure 2. An adult cow elk fitted with a satellite transmitter immediately after release. Following release, the 6 cow elk were monitored via computer with new locations obtained every 23 hours so that all hours of the day could be sampled. Although a sample of 6 elk is small, it does provide insight to elk movements, habitat use, and survival. A brief summary of the results includes:

- 3 of the collared cow elk were migratory and all 3 moved north into Canada, with one spending 2 consecutive summers in Top of the World Provincial Park, approximately 80 miles from the Tobacco Valley.
- 3 of the cow elk were nonmigratory and stayed within the Tobacco Valley area.
- 4 of the 6 cow elk are known to be dead (2 killed by hunters, 1 killed by a lion, and 1 killed by a vehicle). A 5th elk disappeared suddenly and is feared dead. Only 1 elk is known to be alive and still possesses an active collar (depicted in purple in Figure 3).
- Detailed information on habitat use was obtained.

The summer of 2015 was extraordinarily dry, and the number of complaints from area ranchers reached an all-time high. In response, 6 separate supplemental license game damage hunts were arranged that allowed landowners, people chosen by the landowner, and randomly selected hunters from a game damage roster to shoot antlerless elk on private land beginning September 1. The intent of this game damage hunt was not so much to reduce the number of elk, as it was to move the elk off private land and onto adjacent public lands. From all accounts, this effort appeared somewhat successful in displacing elk, but many elk simply moved to adjacent private property and issues still remained. Approximately 20 elk were killed during the game damage hunt prior to the opening of the general season.

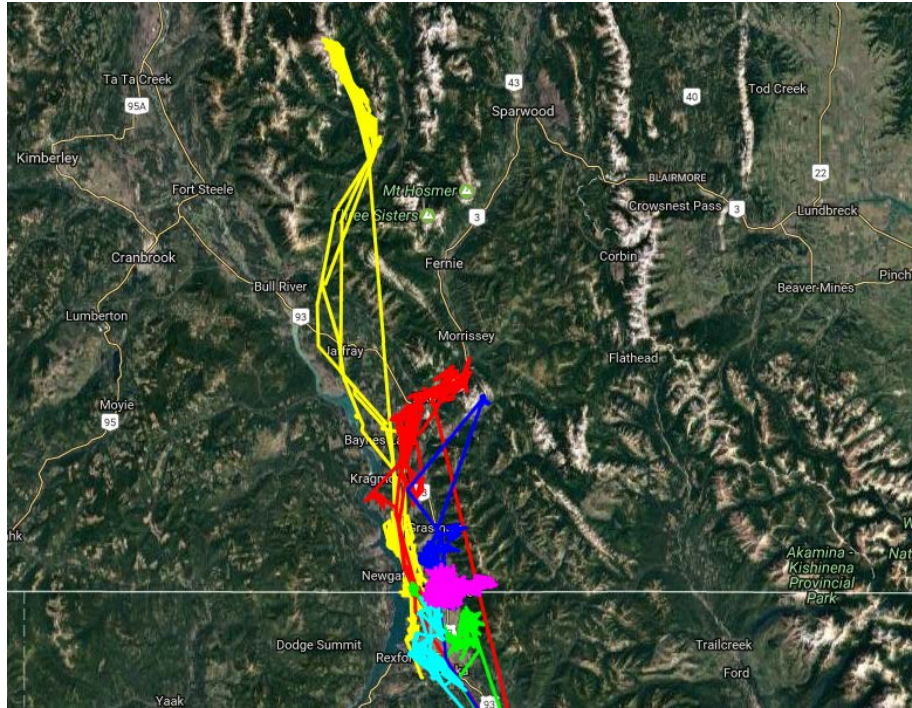


Figure 3. Satellite movements of 6 instrumented collared elk captured north of Eureka.

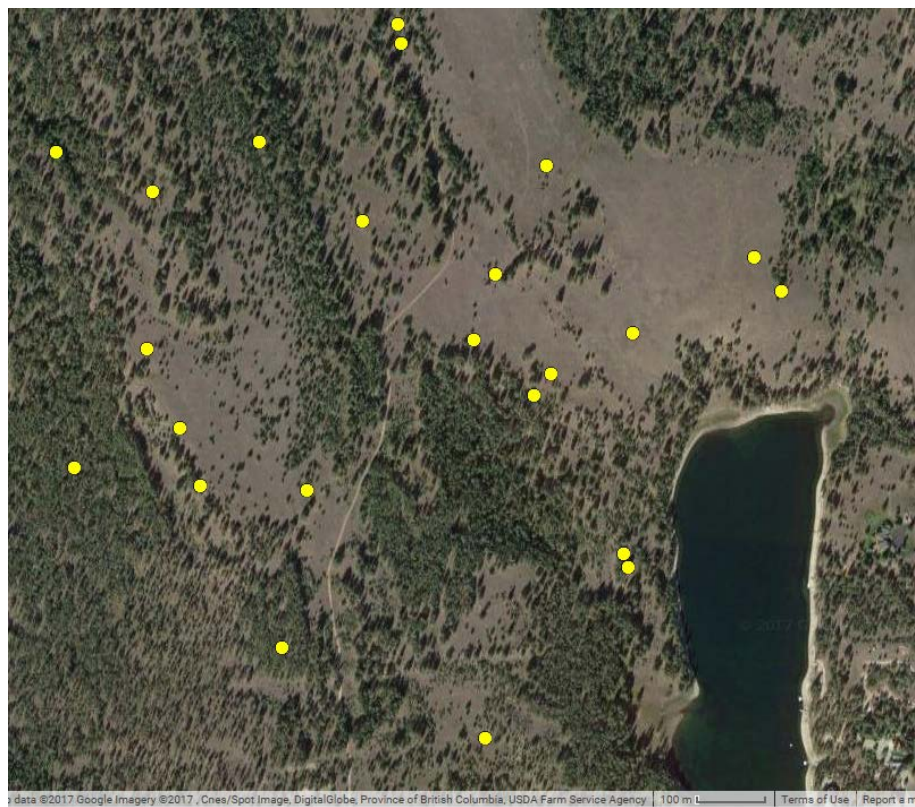


Figure 4. An example of specific locations from Elk #336 showing habitat use in the Gateway area.

In the fall of 2015, the Montana Fish, Wildlife & Parks Commission approved new regulations allowing the taking of elk with a rifle outside the 5-week general season during what would be called “Shoulder Seasons.” Hunting could begin as early as August 15 and run as late as February 15. Hunters could apply for special licenses just as they would normally and no preference was given to landowners and their families, unlike the game damage hunts. These new seasons could be tailored to specific areas to provide maximum flexibility in order to achieve specific objectives.

A meeting was held in Eureka with area ranchers and sportsmen in December 2015, and it was agreed to give a shoulder season a try for the Tobacco Plains area, with hunting for antlerless elk to begin August 15, 2016. A total of 50 permits would be awarded for private land only and would be valid for both Hunting Districts 101 and 109. Hunters were encouraged to secure access and form relationships with landowners before applying for permits.

The results of the 2016 hunting season phone surveys have yet to be completed, so it is unknown how many of the 50 license holders for the shoulder season were successful. Discussions with landowners indicate it was quite successful in pushing elk out of agricultural areas in the valley bottom. Few elk had to be killed before they sought refuge elsewhere. Given that these licenses were valid on all private lands, there were few places they could hide except for public land. Also, given that hunting occurred only on private land, there were few conflicts with archers when the archery season opened in September.

In summary, elk management in the Tobacco Valley is a work in progress and poses many challenges. Subdivision of formerly agricultural lands is increasing, and human population growth is altering the landscape. The Tobacco Valley offers a unique bunch grass habitat that exists in few areas of Northwest Montana. This type of habitat is sought out by wintering elk and provides high quality winter range, which is extremely limited. Managing elk in an increasingly urban area with small land ownerships adds additional challenges. But by cooperating with landowners, sportsmen, the Forest Service, and the Rocky Mountain Elk Foundation, it is hoped this international resource will continue to prosper with the fewest conflicts possible and allow people to enjoy the elk of the Tobacco Valley.